DOCUMENT RESUME

ED 051 820 LI 002 875

TITLE	Information Gathering And Disseminating Activities of the National Library of Medicine.
INSTITUTION	Comptroller General of the U.S., Washington, D.C.
REPORT NO	B-164031(2)
PUB DATE	30 Nov 70
NOTE	45p.
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	Computer Programs, *Information Dissemination, Information Needs, *Information Retrieval, *Information Storage, *Information Systems, *Medical Libraries, Relevance (Information Retrieval)
IDENTIFIERS	*National Library of Medicine

ABSTRACT

The National Library of Medicine maintains a computerized analysis and retrieval system and administers various programs for collecting, publishing, disseminating, and exchanging medical health information. A major use of the library's computer is to prepare bibliographies of biomedical subjects requested by medical schools, researchers, practitioners, public health officials, and other health professionals. The library is encountering problems responding to such requests. About 2 to 4 weeks is required to process requests, and library officials believe that the requests should be processed in a much shorter time. The longer time presently required is due to the relative slowness inherent in the computer's storage and retrieval system. Limitations in the computer's vocabulary, inconsistency in indexing procedures, and errors by the people who do the searching have resulted in data that is not responsive to the requests. (Author/MM)

ED051820

REPORT TO THE CONGRESS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

Information Handling And Disseminating Activities Of The National Library Of Medicine

B-164031(2)

National Institutes of Health
Department of Health, Education, and Welfare

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

NOVEMBER 1970

LI 002 875

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164031(2)

To the President of the Senate and the
Speaker of the House of Representatives

This is our report on information gathering and disseminating activities of the National Library of Medicine, National Institutes of Health, Department of Health, Education, and Welfare.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

Copies of this report are being sent to the Director, Office of Management and Budget, and to the Secretary of Health, Education, and Welfare.

Elmer B. Staats
Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

INFORMATION GATHERING AND DISSEMINATING ACTIVITIES OF THE NATIONAL LIBRARY OF MEDICINE
National Institutes of Health
Department of Health, Education and Welfare B-164031(2)

D I G E S T

WHY THE REVIEW WAS MADE

The National Library of Medicine--claimed by the library to be the world's largest library specializing in fields of science related to medicine--maintains a computerized analysis and retrieval system and administers various programs for collecting, publishing, disseminating, and exchanging medical health information.

The General Accounting Office (GAO) reviewed the library's medical information gathering and disseminating activities to determine how the library was carrying out its important responsibilities under the congressional mandate to serve the Nation's health information needs. GAO also examined into actions being taken to alleviate problems experienced in operating the computer-oriented bibliographic reference system.

FINDINGS AND CONCLUSIONS

A major use of the library's computer has been to prepare bibliographies of biomedical subjects requested by medical schools, researchers, practitioners, public health officials, and other health professionals. The library has encountered problems in responding to such requests. About 2 to 4 weeks are required to process requests, and library officials believe that the requests should be processed in a much shorter time. The longer time presently required is due to the relative slowness inherent in the computer's storage and retrieval system. (See p. 14.) Limitations in the computer's vocabulary, inconsistencies in indexing procedures, and errors by the people who do the searching have resulted in data that is not responsive to the requests. (See p. 16.)

Generally requesters have been furnished with an excessive number of literature citations--an average of 200 for each request and in some cases as many as 500. This creates a problem for the requesters in determining which citations are applicable to their work. (See p. 17.)

To expand the system and correct the problems, the library is currently involved in the development, design, and installation of an improved computer system and in the training of employees in the system's operation. (See p. 20.) If properly installed and operated, the revised system should alleviate the problems. (See p. 22.)

Tear Sheet

NOV.30.1970

The library has not been able to satisfy all the information needs of other agencies having responsibilities for health programs within the Department of Health, Education, and Welfare (HEW). (See p. 18.) GAO believes that special emphasis should be placed on the coordination of the library's operation of the revised system with the needs of the other HEW agencies. (See p. 22.)

Equipment for the initial phase of the new computer system is being leased rather than purchased. Library officials said that decision was the result of a reduction by HEW of the library's budget request. GAO estimated that, if the equipment were purchased and retained for its estimated life of 6 years, the cost would be about $1 million less than if it were leased and the library would acquire an asset having an estimated value of $400,000 at the end of the sixth year. (See p. 24.)

The library provides (with a few exceptions) its services without charge as a public service. This is done with the approval of its board of regents and in accordance with Federal law. The estimated cost to the library of providing biomedical information services, without charge is about $571,000 annually. (See p. 27.)

RECOMMENDATIONS OR SUGGESTIONS

The Secretary of HEW should

--provide for adequate coordination of the library's operation of the revised computer system with the health information requirements and activities of other HEW agencies (see p. 22) and

--require the Director of the library to determine the most economical method of acquiring computer equipment for the Medical Literature Analysis and Retrieval System (MEDLARS) and acquire this equipment at the lowest possible cost to the Government. (See p. 26.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

HEW agreed that coordination of health information requirements and activities of HEW health agencies would be useful and said that the Assistant Secretary for Health and Scientific Affairs would oversee such coordination. (See p. 22.)

HEW said also that action would be taken to obtain the computer equipment in the most economical manner. (See p. 26.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

GAO is reporting to the Congress on the manner in which the library's information program is carried out because of congressional interest in federally supported health research and science information activities. Also the Congress may wish to consider the library's determination that all of its principal activities are public services for which no fees have been charged.

Contents

		Page
DIGEST		1
CHAPTER		
1	INTRODUCTION	4
	Purpose and functions of library	4
	Organization of library	5
	Library source materials and information programs	8
	Broadened scope of library operations	9
2	MEDICAL LITERATURE ANALYSIS AND RETRIEVAL SYSTEM	11
	Installation and objectives of MEDLARS I	11
	Problems in operating MEDLARS I	13
	Design of MEDLARS II	20
	Conclusion	22
	Recommendation to the Secretary of HEW	22
3	ACQUISITION OF EQUIPMENT FOR MEDLARS II	24
	Leasing costs may exceed purchase price	24
	Recommendation to the Secretary of HEW	26
4	INFORMATION SERVICES PROVIDED WITHOUT CHARGE	27
	Types of services provided	27
	Policy of library to provide free services	30
	Matter for consideration by the Congress	31
5	SCOPE OF REVIEW	33
APPENDIX		
I	Comparison of lease-versus-purchase costs of the library's new computer system for a two-shift operation	37
II	Letter dated June 9, 1970, from the Assistant Secretary, Comptroller, Department of Health, Education, and Welfare to the General Accounting Office	38

APPENDIX Page

III Principal officials of the Department of Health, Education, and Welfare responsible for the administration of the activities discussed in this report 41

ABBREVIATIONS

GAO	General Accounting Office
HEW	Department of Health, Education, and Welfare
IBM	International Business Machines Corporation
MEDLARS	Medical Literature Analysis and Retrieval System
NIH	National Institutes of Health
NIMH	National Institute of Mental Health
PHS	Public Health Service

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

INFORMATION GATHERING AND
DISSEMINATING ACTIVITIES OF THE
NATIONAL LIBRARY OF MEDICINE
National Institutes of Health
Department of Health, Education,
and Welfare B-164031(2)

D I G E S T

WHY THE REVIEW WAS MADE

The National Library of Medicine--claimed by the library to be the world's largest library specializing in fields of science related to medicine--maintains a computerized analysis and retrieval system and administers various programs for collecting, publishing, disseminating, and exchanging medical health information.

The General Accounting Office (GAO) reviewed the library's medical information gathering and disseminating activities to determine how the library was carrying out its important responsibilities under the congressional mandate to serve the Nation's health information needs. GAO also examined into actions being taken to alleviate problems experienced in operating the computer-oriented bibliographic reference system.

FINDINGS AND CONCLUSIONS

A major use of the library's computer has been to prepare bibliographies of biomedical subjects requested by medical schools, researchers, practitioners, public health officials, and other health professionals. The library has encountered problems in responding to such requests. About 2 to 4 weeks are required to process requests, and library officials believe that the requests should be processed in a much shorter time. The longer time presently required is due to the relative slowness inherent in the computer's storage and retrieval system. (See p. 14.) Limitations in the computer's vocabulary, inconsistencies in indexing procedures, and errors by the people who do the searching have resulted in data that is not responsive to the requests. (See p. 16.)

Generally requesters have been furnished with an excessive number of literature citations--an average of 200 for each request and in some cases as many as 500. This creates a problem for the requesters in determining which citations are applicable to their work. (See p. 17.)

To expand the system and correct the problems, the library is currently involved in the development, design, and installation of an improved computer system and in the training of employees in the system's operation. (See p. 20.) If properly installed and operated, the revised system should alleviate the problems. (See p. 22.)

The library has not been able to satisfy all the information needs of other agencies having responsibilities for health programs within the Department of Health, Education, and Welfare (HEW). (See p. 18.) GAO believes that special emphasis should be placed on the coordination of the library's operation of the revised system with the needs of the other HEW agencies. (See p. 22.)

Equipment for the initial phase of the new computer system is being leased rather than purchased. Library officials said that decision was the result of a reduction by HEW of the library's budget request. GAO estimated that, if the equipment were purchased and retained for its estimated life of 6 years, the cost would be about $1 million less than if it were leased and the library would acquire an asset having an estimated value of $400,000 at the end of the sixth year. (See p. 24.)

The library provides (with a few exceptions) its services without charge as a public service. This is done with the approval of its board of regents and in accordance with Federal law. The estimated cost to the library of providing biomedical information services, without charge is about $571,000 annually. (See p. 27.)

RECOMMENDATIONS OR SUGGESTIONS

The Secretary of HEW should

--provide for adequate coordination of the library's operation of the revised computer system with the health information requirements and activities of other HEW agencies (see p. 22) and

--require the Director of the library to determine the most economical method of acquiring computer equipment for the Medical Literature Analysis and Retrieval System (MEDLARS) and acquire this equipment at the lowest possible cost to the Government. (See p. 26.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

HEW agreed that coordination of health information requirements and activities of HEW health agencies would be useful and said that the Assistant Secretary for Health and Scientific Affairs would oversee such coordination. (See p. 22.)

HEW said also that action would be taken to obtain the computer equipment in the most economical manner. (See p. 26.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

GAO is reporting to the Congress on the manner in which the library's information program is carried out because of congressional interest in federally supported health research and science information activities. Also the Congress may wish to consider the library's determination that all of its principal activities are public services for which no fees have been charged.

CHAPTER 1

INTRODUCTION

The General Accounting Office has reviewed the information gathering and disseminating activities of the National Library of Medicine, an organizational unit of the National Institutes of Health (NIH), Department of Health, Education, and Welfare. The scope of our review is described on page 33.

The principal officials of HEW responsible for the administration of the activities discussed in this report are listed in appendix III.

PURPOSE AND FUNCTIONS OF LIBRARY

The library is the central resource provided by the Federal Government in developing a national biomedical information system. The library claims that it is the world's largest library specializing in fields of science related to medicine.

The library had its origin in the Library of the Office of the Surgeon General of the Army which was established in 1836. Over the years the library developed into a national resource of biomedical literature, and in 1956, under legislation enacted as the National Library of Medicine Act,[1] the library was made a part of HEW's Public Health Service (PHS) and was officially named the National Library of Medicine.

The basic purpose of the library, as stated in the 1956 act, is:

> "*** to assist the advancement of medical and related sciences, and to aid the dissemination and exchange of scientific and other information

---

[1]This act became part H of title III of the Public Health Service Act (42 U.S.C. 276).

important to the progress of medicine and to the public health."

To fulfill its basic purpose, the library (1) collects, disseminates, and exchanges medical health information, (2) serves as a repository of medical health information for members of the biomedical health community, (3) publishes and distributes catalogs, indexes, and bibliographies of medical literature and audio-visual materials, (4) develops, produces, and disseminates audio-visual materials, (5) encourages and supports the translation and publication of foreign language biomedical literature, and (6) provides support to public and private nonprofit institutions for improving and expanding basic medical library resources and for training medical librarians and health information specialists.

In December 1961 the present library structure in Bethesda, Maryland, was dedicated. This five-story building contains the library's collection of books and assorted literature and a sophisticated computerized information center. (See pictures provided by NIH on pp. 6 and 7.)

In fiscal year 1970, the library's total obligations amounted to $20.3 million, of which $14.1 million was for operation of the library and its information programs and $6.2 million was for its program of grant assistance to the Nation's medical libraries and for research, training, and publications. (See p. 9.) In carrying out its responsibilities, the library employed 489 full-time persons at June 30, 1969, and 461 at June 30, 1970.

ORGANIZATION OF LIBRARY

As part of the reorganization of PHS in 1968, the library, which formerly was directly under the Surgeon General, was placed under NIH. The library is headed by a Director, and its operations are organized into five major offices--Library Operations, Extramural Programs, Specialized Information Services, the Lister Hill National Center for Biomedical Communications, and the National Medical Audiovisual Center.

NATIONAL LIBRARY OF MEDICINE

MAIN READING ROOM OF THE
NATIONAL LIBRARY OF MEDICINE

A board of regents advises, consults with, and makes recommendations to the Director of NIH on matters of policy concerning library operations. The board has 17 members, seven of whom serve ex officio. The ex officio members are the Surgeons General of PHS and the military services, the Chief Medical Director of the Department of Medicine and Surgery of the Veterans Administration, the Division Director for Biological and Medical Sciences of the National Science Foundation, and the Librarian of Congress. The other 10 members are appointed by the President, with the advice and consent of the Senate, for terms of 4 years. These 10 members are selected from among leaders in the various fields of the fundamental sciences, medicine, dentistry, public health, hospital administration, pharmacology, or scientific or medical library work, or in public affairs.

LIBRARY SOURCE MATERIALS AND INFORMATION PROGRAMS

The library has been described in an HEW publication as the world's largest research library in a single scientific and professional field. The library has reported that it has a collection of nearly 1.3 million volumes of biomedical literature, including biomedical books, theses, journals, pamphlets, prints, microfilms, and audio-visual materials in more than 70 languages. The library acquires more than 100,000 new pieces of literature each year. The new titles are cataloged and listed biweekly in a computer-prepared catalog of new publications. The library's mission is to acquire all new literature of direct concern to medicine and all applicable literature from the allied sciences. In this endeavor it obligated funds of about $361,000 during fiscal year 1970 for new acquisitions. It also receives a large amount of material free.

The library prepares a monthly subject-and-author index from about 2,300 journals which are in 40 languages. During fiscal year 1970, about 210,000 articles in the journals were indexed, of which 43 percent were indexed by library employees and 57 percent by domestic and foreign agencies under contracts and cooperative agreements. The index citations--each of which includes the article and journal titles, author, volume, issue and page number, date,

language, and key descriptive words--are stored on the library's computer tapes and are used as source material to prepare the monthly index to current articles, recurring bibliographies in specialized fields of health science, and demand bibliographies in response to special requests.

BROADENED SCOPE OF LIBRARY OPERATIONS

The scope of the library's duties was broadened by the Medical Library Assistance Act of 1965 (42 U.S.C. 241-280a) which authorized assistance to the Nation's medical libraries through a program of grants and contracts. Public and private nonprofit institutions may qualify for this assistance for the purposes of constructing medical library facilities, improving and expanding basic medical library resources, training medical librarians and other information specialists, conducting research in the field of medical library science, providing financial support for the preparation or publication of biomedical scientific publications, and developing regional medical libraries. At June 30, 1970, 10 regional medical libraries were providing services in designated geographical regions of the United States similar to those provided by the national library. Individuals may obtain assistance from the library for traineeships, fellowships, and special scientific projects.

Effective December 1968 the administration of library construction grants was assigned to NIH's Bureau of Health Professions Education and Manpower Training which has been made responsible for all NIH construction grant programs.

The Drug Literature Program, initiated in 1965, increased the scope of the library's information functions. The purpose of this program is to facilitate the retrieval of literature on drugs through the library's computer system for the use of other governmental agencies and the entire biomedical community.

The library's duties were further increased in 1967 when the National Medical Audiovisual Center, located in Atlanta, Georgia, and previously associated with the National Communicable Disease Center of PHS, became a part of

the library. The National Medical Audiovisual Center was founded during World War II as a part of the Malaria Control in War Areas Program which made extensive use of visual teaching aids for instructing military and civilian personnel in emergency training efforts and which led to the establishment of an audio-visual center for biomedicine.

A recent addition to the library's information responsibilities is the Toxicology[1] Information Program. In accordance with a recommendation of the President's Science Advisory Committee in its report "Handling of Toxicological Information," a computer-based toxicology program was established by the library in 1967. Subsequently, the library combined the Drug Literature Program with the Toxicology Information Program, because of their similar objectives and activites.

---

[1]A science that deals with poisons and their effects on health and the clinical, industrial, and legal problems involved.

CHAPTER 2

MEDICAL LITERATURE ANALYSIS AND RETRIEVAL SYSTEM

INSTALLATION AND OBJECTIVES OF MEDLARS I

Prior to 1960 the library manually prepared a monthly index to current medical literature by typing pertinent bibliographic citations on index cards which were mounted on panels and photographed. This manual operation was replaced in 1960 by a partially mechanized system under which bibliographic citations were imprinted on tabulating cards by using special paper-tape typewriters. These cards were machine sorted and automatically photographed, and the developed film was cut and assembled into pages for printing.

The library found that this partially mechanized system could not provide for quick retrieval of citations from the increasing store of biomedical literature needed by medical schools, researchers, practitioners, public health officials, and other health professionals in public or private activities. Therefore in 1961 the library awarded a contract to a consultant for development of specifications for a computer-oriented information storage and retrieval system, known as MEDLARS I.

The design of MEDLARS I was completed in January 1962. Following preparation of computer programs, installation of equipment, training of personnel, and testing of equipment and programs, MEDLARS I, based on a Honeywell 800/200 computer system, became operational in January 1964. The library is currently involved in the development, design, and installation of an improved system, known as MEDLARS II. (See pp. 20 to 22.)

The library's stated objectives for the computerized system were to (1) improve the quality of, and reduce the time needed to prepare, the monthly index to current articles, (2) index journal articles in more depth, (3) prepare literature searches in specialized fields, and (4) provide rapid retrieval of citations from the literature files.

specialists. The computer is programmed to handle the tasks of storage, data manipulation, and printing citations.

Since fiscal year 1965, the library has developed a regional network arrangement through which MEDLARS and certain other information services can be shared by other libraries. In fiscal year 1970, the network was expanded to 13 MEDLARS stations in the United States and six MEDLARS stations in foreign countries. Demand searches performed in fiscal year 1970 by the library, U.S. stations, and foreign stations totaled 20,700, as follows:

Library	3,600
U.S. stations	10,700
Foreign stations	6,400
Total	20,700

PROBLEMS IN OPERATING MEDLARS I

Although MEDLARS I has made possible the implementation of the demand search, a number of problems have developed in promptly and adequately meeting the needs of requesters of demand searches.

1. The library requires about 2 to 4 weeks to process demand-search requests. Library officials told us that they believe that all requests should be processed in a much shorter time. The longer time presently required is due to the relatively slow processing times inherent in MEDLARS I's sequential-access data storage and retrieval system.[1]

---

[1] A data storage system in which the items of information stored become available only in a one-after-the-other sequence, whether all the information or some of it is desired.

2. Limitations and deficiencies in the MEDLARS I vocabulary,[1] inconsistencies in indexing procedures, and errors by search formulators have resulted in failures to produce responsive data.

3. Generally requesters have been furnished with an excessive number of citations.

The library made a comprehensive study of the present system, its shortcomings, and the actions needed to overcome them. The problems encountered by the library and the remedial actions taken or planned are described below.

Delays resulting from sequential-access system

The library found that the relatively slow processing time inherent in its computer's sequential-access data storage and retrieval system would not allow the library to keep pace with the increase in (1) the number of articles to be indexed and processed as input into the computer and (2) the requests for demand searches and other computer outputs. The table below illustrates the increase in workloads from fiscal year 1964 to fiscal year 1970.

	Fiscal year	
	1964	1970
Input:		
Total articles indexed	144,057	210,000
Output:		
Demand searches performed by library	536	8,145[a]
Selected literature searches	-	46
Recurring bibliographies	3	18

[a]Of this total, 3,600 were formulated and processed by the library. The rest were formulated by MEDLARS stations and processed by the library's computer system.

---

[1]The vocabulary contains medical subject headings consisting of words and terms which are used for indexing articles and characterizing an article's content.

In January 1967 the library adopted a schedule which provided that 50 percent of the requests be processed within 2 weeks of receipt, 80 percent within 3 weeks, and 90 percent within 4 weeks. Library officials told us, however, that they considered these processing times unsatisfactory, because they believed that all requests should be processed within about 2 working days.

Because of the use of a sequential-access storage and retrieval system, demand searches have required about 40 percent of the computer's time, although these searches account for only about 21 percent of the computer's output measured by pages of data produced. On the other hand, retrospective bibliographies have required less than 19 percent of the computer's time, although they accounted for 69 percent of the computer's output measured by pages of data produced.

The plans for the new computer system for the library's updated MEDLARS II provide for a random-access data storage and retrieval[1] capability which is expected to significantly reduce the processing time.

---

[1] A data storage system from which information can be obtained directly from each storage location without following the one-after-the-other sequence required in sequential-access storage.

Inadequate MEDLARS I vocabulary inconsistencies in indexing procedures and searching errors

The library made an evaluation of the MEDLARS I demand-search service on the basis of a sample of 300 demand requests processed between August 1966 and July 1967 and concluded that, on the average, the system retrieved only 65 percent of all citations stored which were known to be of value for any given search and that an average of 50 percent of all retrieved citations were judged to be of relevance by the requester.

The library found that a large portion of the system's [illegible] to the inadequacies of deficiencies in the MEDLARS I vocabulary; to the inappropriate use of terms in the vocabulary by indexers; and to a variety of errors by search formulators, such as an inappropriate use of terms. The evaluation further showed that these shortcomings accounted for (1) about 73 percent of all recall failures--citations which the evaluation had judged to be of value to the requester but which were not retrieved--and (2) about 81 percent of all precision failures--citations which were retrieved but which were judged by the requester to be of no value.

MEDLARS I is capable of processing data that has been indexed and will retrieve bibliographic citations in response to requests programmed by the search formulators. According to library officials, however, the concepts governing the assignment of indexing terms and the development of the vocabulary are not always compatible with retrieval needs.

Library officials informed us that, to remedy the shortcomings disclosed by the evaluation of MEDLARS I, those responsible for the MEDLARS operation are being trained to familiarize them with the indexing of articles, the vocabulary development, and the logic of search formulation. To this end employees on these assignments rotate or divide their daily work between the several operations.

Library officials, however, stressed that a most important factor for an improved MEDLARS operation is an expanded

vocabulary of subject headings, which is needed to provide search formulators with more specific terminology in formulating search requests for processing through the computer. They informed us that the library planned to expand the vocabulary of subject headings from 7,500 terms under MEDLARS I to a much larger number under MEDLARS II.

Excessive volume of citations furnished

According to the library's records, the number of index citations provided for each search request has averaged about 200. In some cases requesters were provided with as many as 500 citations, and in one case a requester was provided with 791 citations. Such a large volume of citations requires a requester to spend a great deal of time obtaining and reviewing the cited articles to determine their applicability to his work. He must make this review because the citations provided by the library do not include an abstract or digest of the principal message of the article but merely give the title of the article, the author, the name of the publication, and certain key words which indicate generally the subject of the article.

Library records indicated that articles may have been cited which were of little value to the requester, because the request was not specific enough or because the search formulator did not analyze properly the request.

In October 1968, the library started using a new demand-search-request form which requires the requester to furnish additional information in his request, based on a more thorough review of his bibliographic needs, prior to submitting his request. The library now requires a requester to (1) identify search limitations, such as the age groups or geographic areas which are considered to be of interest and whether foreign language literature should be considered, (2) list known relevant articles, (3) choose between a broad or narrow search, and (4) indicate the number of citations expected.

Inability of MEDLARS I to meet needs of another HEW health agency

We noted that one other organizational unit in HEW responsible for health program activities--the National Institute of Mental Health (NIMH), a bureau of the Health Services and Mental Health Administration--had not been able to obtain certain needed bibliographic data in its field of specialization through the library's MEDLARS I system and had developed its own sources of information and means of dissemination.

NIMH operates the National Clearinghouse for Mental Health Information which collects, analyzes, and disseminates scientific and technical information. The three basic functions of the clearinghouse are to (1) provide scientific information both upon request and in the form of recurring and single-issue publications, (2) provide scientific analyses and compilations which present overviews and syntheses of current research activities, and (3) attempt to develop new solutions to scientific information problems.

To carry out its information activities in the field of mental health, NIMH established its own computerized information system, using an International Business Machines Corporation (IBM) 360/50 computer. This system was considered necessary to supply specialized bibliographic data to users who, according to NIMH records, represent such organizations as community mental health centers, hospitals, educational institutions, and Government agencies. The estimated cost of operating the system during fiscal year 1970 was about $600,000, exclusive of personnel costs.

A special feature of NIMH's system is its ability to provide abstracts of articles in normal sentence structure, enabling a requester of bibliographic information to more readily identify articles of interest to him than is possible under the MEDLARS system which only provides key words. These abstracts are prepared by outside sources under contract.

A NIMH official told us that NIMH could not obtain all of its needed bibliographic data through the MEDLARS I system because the library gathered only biomedical mental

health information, whereas NIMH also required mental health information in the social, behavioral, and occupational fields. He told us also that NIMH would consider using the library's expanded information services when the MEDLARS II system was placed in operation.

DESIGN OF MEDLARS II

To enable the performance of its additional responsibilities for new information programs and to alleviate the aforementioned problems in carrying out demand searches, the library is currently involved in the development, design, and installation of an improved computer system, referred to as MEDLARS II.

NIH awarded a cost-plus-fixed-fee contract in May 1966 to a management consultant firm to develop and recommend revised systems performance requirements to serve as a basis for determining the library's long-range computer equipment and program needs. The amount of this contract was $114,868. A task force composed of library, NIH, and other HEW personnel was formed to assist in determining the library's needs. The contractor developed systems specifications which served as the basis for requesting interested bidders to submit proposals for a contract for the design, development, and implementation of the MEDLARS II computer system.

In September 1967, NIH awarded a labor-hour contract, not to exceed $38,400, to the same management consultant firm to furnish technical assistance in evaluating the bid proposals for the contract.

In June 1968, after the bid proposals had been evaluated, NIH awarded a cost-plus-fixed-fee contract to a systems analysis firm at an estimated cost of about $2 million for the design, development, and installation of the MEDLARS II computer system, to be completed by September 1969. The contract also provided for operator and programmer training and a system of remote terminal devices to be completed by October 1971 and December 1971, respectively.

Because of contractor delays in meeting the delivery schedule, in June 1969 the library negotiated a cost-plus-incentive-fee supplemental agreement to the contract, which redefined the description of the work, amended the delivery schedule, and increased the estimated cost of the contract. The agreement provided for (1) an initial implementation phase covering the installation of a computer system incorporating a random-access feature and the automation of certain additional operations and (2) an extended implementation

phase covering the linking of remote terminal devices to the computer to permit direct searches of stored information by regional libraries and medical school libraries which are to be connected to the system. The estimated completion dates are November 1970 for the initial implementation phase and June 1971 for the extended implementation phase. The estimated costs of the initial and extended phases are $2.3 million and $900,000, respectively.

The total estimated contract costs of $3.2 million include the cost of direct labor, overhead, travel, training aids and manuals, general and administrative expenses, and a fee but does not include the rental of the automatic data processing equipment which is leased under a separate contract (discussed in ch. 3).

The proposed MEDLARS II system will incorporate numerous sophisticated capabilities, including a greatly expanded vocabulary which, according to library officials, should give it the required capacity and flexibility to meet the expanding information requirements. For example, the random-access feature will result in increased storage capacity, substantially reduced processing time for demand searches and recurring bibliographies, and the ability to store and retrieve short narrative abstracts of journal articles and other source data in the memory file.

Library officials told us, however, that, although MEDLARS II would have the ability to store and retrieve abstracts of articles, it would not have the capability to prepare such abstracts. They explained that abstracting of scientific articles in the fields of biomedicine required specialized knowledge and learning which the library's indexing staff did not possess; that the library encouraged authors to prepare summaries of their articles for use in preparing abstracts; but that various practical, technological, and legal problems prevented the development of a feasible method of preparing and retrieving abstracts for a major part of biomedical literature.

We noted that several research institutes of NIH had arranged for the preparation by contractors of abstracts

from pertinent medical literature on specific categories of diseases within their areas of responsibility. The library anticipates that the research institutes will continue to have pertinent abstracts prepared under contract after installation of MEDLARS II, because the library will not have the capability to prepare abstracts of current medical literature.

CONCLUSION

We believe that the management of the library, by the design and proposed installation of MEDLARS II and by attention to the training of employees in the operation of the system, has initiated appropriate action to alleviate the problems experienced in the operation of MEDLARS I, as discussed in the foregoing sections. If properly installed and operated, the revised system should permit the library to provide more useful information to requesters of bibliographic data and provide it in a more expeditious manner. The feasibility of preparing abstracts of medical literature, or of literature in certain specialized areas, may deserve further study by the library.

We believe, however, that, in the development of improved MEDLARS II operations, special emphasis should be placed on adequate coordination of the library's health information gathering and disseminating activities with the health information activities of other organizational units within HEW so that the needs of these other units can be properly considered and possible duplication of effort avoided.

RECOMMENDATION TO THE SECRETARY OF HEW

We recommend that the Secretary of Health, Education, and Welfare provide for adequate coordination, through the Assistant Secretary for Health and Scientific Affairs, of the library's improved MEDLARS operation with the health information requirements and activities of other HEW agencies responsible for health programs.

In its comments dated June 9, 1970 (see app. II), on a draft of this report, HEW stated that it agreed that such

coordination would be useful and that the Assistant Secretary for Health and Scientific Affairs would provide for and oversee such coordination.

CHAPTER 3

ACQUISITION OF EQUIPMENT FOR MEDLARS II

Bureau of the Budget Circular No. A-54, dated October 14, 1961, prescribes policies for the guidance of Federal agencies in making determinations as to whether automatic data processing equipment should be leased or purchased. The circular provides that a Federal agency should choose that method of acquiring such equipment which offers the greatest advantage to the Government and requires that the method chosen be documented to adequately show the basis for the decision. The HEW Administrative Manual requires the observance of Circular No. A-54 whenever new equipment is acquired by HEW constituent agencies or offices.

LEASING COSTS MAY EXCEED PURCHASE PRICE

Library officials informed us that the library originally had planned to purchase the equipment for MEDLARS II and had included in its fiscal year 1968 budget submission a request for approximately $10 million for systems design, programming, and purchase of the MEDLARS II equipment. They stated that the library did not make a lease-versus-purchase study prior to the budget submission, because of the lack of information concerning the specific equipment required for the system. The amount requested was based on an estimate provided by the consulting firm that had developed the MEDLARS II system performance requirements. Library officials informed us also that the amount of the budget request was reduced at the direction of HEW and that, as a result, the funds available for library operations did not permit purchase of the equipment.

When the library requested proposals for MEDLARS II equipment requirements in the latter part of 1967, the bidders were required to show the prices for both purchasing and leasing the equipment. In November 1967 the successful bidder advised the library that the equipment required for the MEDLARS II system could be designed, programmed, and purchased at a total cost of about $5.7 million, instead of the originally estimated $10 million. Library officials informed us that they did not prepare a lease-versus-purchase

study based on the more recent information because the library's 5-year budgetary plan had been based, in part, on the assumption that the MEDLARS II equipment would be leased and that budget limitations would not permit both the purchase of the MEDLARS II equipment and the carrying out of the library's other programs.

The library decided to lease the equipment and, in October 1968, entered into a lease agreement under a General Services Administration supply contract with IBM for an IBM 360/50 computer and related equipment to fulfill the requirement for the initial implementation phase of MEDLARS II.

Our review of the leasing arrangements for the equipment needed under the initial phase of MEDLARS II indicated that, if the equipment were retained for its estimated 6- or 7-year life, this method of acquisition would be substantially more costly to the Government than an outright purchase. We estimated that, for the initial-phase equipment, the leasing costs over a 6-year period would amount to $4.9 million and that purchase costs over the same period, including the costs of installation, maintenance, and interest on investment, would amount to about $3.9 million, or $1 million less than the leasing costs. Moreover, if the library purchased the computer system, at the end of the sixth year it would own an asset having an estimated value of $400,000, which would be available for future use, transfer, or trade-in. Our comparison of this cost data as it applies to purchase or lease of the equipment is summarized in appendix I.

Our cost comparison and estimate of possible savings of $1.4 million was made only for the procurement of the equipment presently specified for the initial implementation phase of MEDLARS II, because the specific equipment required for the extended implementation phase had not been determined at the time of our review. If the equipment to be acquired for the extended implementation phase were to have a useful life similar to that of the initial-phase equipment, savings would probably also be realized by purchasing rather than leasing the equipment.

Library officials have informed us that they now believe that the equipment requirements for the initial phase of MEDLARS II may have to be revised and that the systems analysis firm which designed the system was to furnish information on the changes in September 1970. We believe, therefore, that the library should make a lease-versus-purchase study as soon as the equipment requirements have been identified for both phases of implementation in order to determine the most economical method of acquisition. The lease agreement for the initial-phase equipment contains a purchase option which provides that the Government may purchase any of the leased equipment at IBM's established price less an established portion of the rental paid to the date of purchase. We believe that the library should determine whether it is to its advantage to exercise this purchase option.

RECOMMENDATION TO THE SECRETARY OF HEW

We recommend that the Secretary of Health, Education, and Welfare require the Director of the library to determine the most economical method of acquiring the equipment for the two phases of implementation of the MEDLARS II system and, to the extent practicable, take action to acquire this equipment at the lowest possible cost to the Government.

In its comments (see app. II), HEW informed us that recent changes in equipment requirements might have invalidated the library's original position that buying the equipment would be more economical than leasing and that another comparison between lease and purchase costs would have to be made when equipment requirements were fully developed. HEW stated that, to the extent practicable, action would then be taken to obtain the equipment in the most economical manner.

CHAPTER 4

INFORMATION SERVICES PROVIDED WITHOUT CHARGE

In carrying out its responsibilities, the library provides a wide range of services to qualified health professionals without charging a fee for the services.

TYPES OF SERVICES PROVIDED

The types of services provided by the library and the estimated costs of providing such services in fiscal year 1967, according to a cost study prepared by the library, were as follows:

	Number provided	Estimated cost
Demand searches	3,689	$231,900
Selected literature searches	11	3,400
Recurring bibliographies	58	71,700
Reference requests	91,622	53,500
Interlibrary loans	176,200	210,900
Total		$571,400

Demand searches and recurring bibliographies are two of the main products of the library's MEDLARS operation and are described on page 12.

A selected literature search is similar to a demand search but involves the accumulation of bibliographic data in a specialized area in which there is believed to be widespread interest. When these bibliographies are prepared, they are announced in professional journals and are made available, upon request, to qualified medical organizations and individuals.

Reference requests, which involve searches for medical journal citations and other medical information, are carried out manually by the library when the computer cannot provide the requested information.

The aforementioned costs do not include the costs of preparing the monthly issues of "Index Medicus" and the auxiliary publications or catalogs based on the index. These publications can be purchased from the Superintendent of Documents, Government Printing Office, at an annual subscription price or at a quantity discount price. These prices cover only the printing and distribution costs incurred by the Government Printing Office.

Similarly, certain MEDLARS-produced recurring bibliographies can be purchased at stated prices from the organizations for which these bibliographies are prepared, and bibliographies published by NLM Institutes can be purchased from the Superintendent of Documents, Government Printing Office.

Another important information-disseminating function which the library performs is making available medical articles or books to qualified persons located throughout the country who request such material through their local libraries. This program is known as the Interlibrary Loan Program. The library ordinarily fills requests for articles by providing photocopies of the requested articles if the material does not exceed 50 pages. The photocopied materials are supplied without charge through the local libraries to the persons who requested the material. The library pays the shipping costs for the photocopies which the requesters are allowed to retain. In preparing photocopies, the library utilizes five mobile camera units (see picture, provided by the library, on p. 29) which are operated along the stack aisles, thus reducing the labor that is required in removing and returning the library material.

During fiscal year 1970, the library, under the Interlibrary Loan Program, handled about 94,000 requests by providing approximately 1.1 million pages of photocopies to individuals, private companies, Federal agencies, public and private hospitals, and universities and colleges, through their local or organizational libraries.

The library charges a fee for special photographic services, such as for microfilm, film slides, and photocopying other than the photocopying under the Interlibrary Loan Program. During fiscal year 1970, the library received about $3,900 in fees for these special services.

MOBILE CAMERA UNIT

POLICY ON LIBRARY TO PROVIDE FREE SERVICES

Section 372(c) of part H-National Library of Medicine, of the Public Health Service Act (42 U.S.C. 275) authorizes the library to provide its services either without charge or on a charge basis as follows:

> "(c) The Surgeon General[1] is authorized, after obtaining the advice and recommendations of the Board [of Regents] ..., to prescribe rules under which the Library will provide copies of its publications or materials, or will make available its facilities for research or its bibliographic, reference, or other services, to public and private agencies and organizations, institutions, and individuals. Such rules may provide for making available such publications, materials, facilities, or services (1) without charge as a public service, or (2) upon a loan, exchange, or charge basis, or (3) in appropriate circumstances, under contract arrangements made with a public or other nonprofit agency, organization, or institution."

In 1957 the board of regents approved the library's policy of not charging for its services and on several occasions has reaffirmed its position. The minutes of the board's meeting in June 1968 state:

> "The Board of Regents reaffirms its position that the National Library of Medicine should continue to provide its services in the tradition of the 'Free Library' without cost to qualified users. The Board considers the provision of bibliographic services, whether furnished in the traditional manner by a reference librarian or through the means of a

---

[1]Reorganization Plan No. 3 of 1966 transferred all statutory powers and functions of the Surgeon General to the Secretary of HEW. The Secretary has delegated to the Director of NIH the authority regarding the manner in which the library's services are to be provided.

computer based MEDLARS file, to be a part of the free library services to meet the health needs of the nation."

Because interlibrary loans account for a significant portion of the total costs of the free services and because the cost of each loan is small and only a small fee would be needed to recover the library's costs, we requested HEW's comments on the library's policy of not charging for these services.

HEW stated its belief that a reappraisal of the library's policy of providing free services was not needed, since the library, the board of regents, and NIH had carefully considered the library's policy. HEW pointed out that the library's mission was to collect, disseminate, and exchange information essential to the progress of medicine and health and that the photocopies furnished were part of the interlibrary loan service provided routinely to health professionals through other libraries. HEW explained that the photocopies, in lieu of the original materials, were provided at the library's discretion and that this method of operation was more effective and economical than the circulation of original materials.

HEW stated its belief also that the benefit realized by the public was greater than the benefit to the individual user and that the service should be provided free. HEW stated further that it believed that the institution of charges would be a barrier to the widest desirable dissemination of interlibrary loan services to all parts of the biomedical community and would not be consistent with the library's function to support local and regional medical libraries and help establish a national medical library network.

MATTER FOR CONSIDERATION BY THE CONGRESS

We recognize that the library has a special mission in the dissemination of health information and that the authorizing legislation gives HEW discretion whether to charge for the library's services. In view of the congressional interest in charges by Federal agencies for specialized services furnished by them, however, we believe

that the Congress may wish to consider the library's determination that all of its principal activities were public services for which no fees had been charged.

CHAPTER 5

SCOPE OF REVIEW

We reviewed the policies and procedures followed by the library in carrying out its responsibilities for collecting and disseminating information important to the progress of medicine and public health. In particular, we reviewed the operations of MEDLARS, the extent to which MEDLARS satisfied the requirements of those seeking information, and the actions being taken by the library to acquire and install an improved computerized system.

Our review was made primarily at the library in Bethesda. We obtained information on such information activities conducted by other organizational units of NLM to determine their relationship to, and coordination with, the activities of the library.

APPENDIXES

APPENDIX I

COMPARISON OF LEASE-VERSUS-PURCHASE COSTS
OF THE LIBRARY'S NEW COMPUTER SYSTEM FOR
A TWO-SHIFT OPERATION

	End of					
	1st year	2d year	3d year	4th year	5th year	6th year
CUMULATIVE PURCHASE COSTS:						
Purchase price (note a)	$2,797,350	$2,797,350	$2,797,350	$2,797,350	$2,797,350	$2,797,350
Field installation costs (note a)	4,867	4,867	4,867	4,867	4,867	4,867
Maintenance costs (note a)	74,728	149,456	224,184	298,912	373,640	448,368
Interest on capital investment (note b)	161,131	299,414	414,404	507,152	576,869	623,853
Total	3,038,076	3,251,087	3,440,805	3,608,281	3,752,726	3,874,438
Less residual value (note c)	1,821,442	1,401,111	980,779	700,557	560,444	420,335
Net purchase costs	1,216,634	1,849,976	2,460,026	2,907,724	3,192,282	3,454,103
CUMULATIVE LEASE COSTS	810,396	1,620,792	2,431,188	3,241,584	4,051,980	4,862,376
PURCHASE EXCEEDS LEASE COSTS	$ 406,238	$ 229,184	$ 28,838	-	-	-
LEASE EXCEEDS PURCHASE COSTS				$ 333,860	$ 859,698	$1,408,273

[a]Purchase price, field installation, and maintenance costs are based on information contained in the Authorized Federal Supply Schedule Price List for the period July 1, 1968, through June 30, 1969.

[b]Interest costs are calculated at the average rate (5.75%) of marketable obligations of the outstanding public debt at April 24, 1968 (date decision was made to lease the equipment).

[c]The deduction of estimated residual values is based on a representative estimate and is subject to change. The following percentages were obtained from a private broker.

Age of equipment in years	Value of equipment as percent of original purchase price
1	65
2	50
3	35
4	25
5 and older	5 less each year

Note: All computations are consistent with instructions contained in the Bureau of the Budget Circular No. A-54, dated October 14, 1961, and as amended June 27, 1967.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
WASHINGTON, D.C. 20201

OFFICE OF THE SECRETARY

JUN 9 1970

Mr. Frederick K. Rabel
Assistant Director
Civil Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Rabel:

The Secretary has asked that I reply to your draft report on the information gathering and dissemination activities of the National Library of Medicine, National Institutes of Health. The enclosed statement sets forth the Department's comments on the specific findings and recommendations in the draft report.

We appreciate the opportunity to review and comment on the draft report.

Sincerely yours,

James F. Kelly
Assistant Secretary, Comptroller

Enclosure

DHEW COMMENTS ON GAO DRAFT REPORT ON
INFORMATION GATHERING AND DISSEMINATION ACTIVITIES
OF THE NATIONAL LIBRARY OF MEDICINE

GAO RECOMMENDATION - p. 20

We recommend that the Secretary of HEW provide for adequate coordination on the departmental level, possibly through the Assistant Secretary for Health and Scientific Affairs, of the Library's improved MEDLARS operation with the health information requirements and activities of other HEW agencies charged with health program responsibilities.

DHEW Comments

We agree that coordination of MEDLARS operations with the health information requirements and activities of other HEW health agencies would be useful. Therefore, the Assistant Secretary for Health and Scientific Affairs will provide for and oversee such coordination.

GAO RECOMMENDATION - p. 23

On the basis of our cost comparison for the initial equipment to be installed, we believe that it would be more economical for the Government to purchase the computer and related ADP equipment for MEDLARS II rather than to lease it. We therefore recommend that the Secretary provide for the Director of the Library to determine the most economical method of acquiring MEDLARS II equipment in its two stages of implementation and, to the extent practicable, take action to secure the maximum savings to the Government in the acquisition of this equipment.

DHEW Comments

Plans completed before the beginning of the MEDLARS II system design showed that purchasing equipment for the MEDLARS II system would be more economical than leasing it. Accordingly, NLM, in its budget requests for fiscal years 1968 and 1969, requested funds for the purchase of this equipment. However, because of severe budget constraints imposed by Congress and the President, the NLM budget requests were reduced and NLM was forced to lease rather than purchase the equipment. This was reported to the Bureau of the Budget examiner and to the appropriations committees.

Recent changes in equipment requirements may have invalidated the original position and purchase may no longer be more economical. Therefore, we feel that, when the development of the system equipment requirements is completed for MEDLARS II, another comparison must be made between the costs of leasing and purchasing the equipment. To the extent practicable action will then be taken to obtain this equipment in the most economical manner.

[See GAO note.]

GAO note: Deleted comments refer to material contained in draft report but omitted from final report.

APPENDIX III

PRINCIPAL OFFICIALS OF

THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

RESPONSIBLE FOR THE ADMINISTRATION OF THE ACTIVITIES

DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
SECRETARY OF HEALTH, EDUCATION, AND WELFARE:		
Elliot L. Richardson	June 1970	Present
Robert H. Finch	Jan. 1969	June 1970
Wilbur J. Cohen	Mar. 1968	Jan. 1969
John W. Gardner	Aug. 1965	Mar. 1968
Anthony J. Celebrezze	July 1962	Aug. 1965
ASSISTANT SECRETARY (HEALTH AND SCIENTIFIC AFFAIRS) (note a):		
Roger O. Egeberg	July 1969	Present
Philip R. Lee	Nov. 1965	Jan. 1969
SURGEON GENERAL, PUBLIC HEALTH SERVICE:		
Jesse L. Steinfeld	Dec. 1969	Present
William H. Stewart	Oct. 1965	July 1969
Luther L. Terry	Mar. 1961	Oct. 1965
DIRECTOR, NATIONAL INSTITUTES OF HEALTH:		
Robert Q. Marston	Sept. 1968	Present
James A. Shannon	Aug. 1955	Aug. 1968
DIRECTOR, NATIONAL LIBRARY OF MEDICINE:		
Martin M. Cummings	Jan. 1964	Present
Frank B. Rogers	1948	Aug. 1963

[a]In 1968 the Assistant Secretary was given direct authority over the Public Health Service and the Surgeon General was made the principal deputy to the Assistant Secretary.

U.S. GAO Wash., D.C.